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Up and Down the Value-Added Tax

Asymmetric Incidence of a Large VAT Reform in Portugal

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Abstract

This paper assesses the incidence of a large and temporary increase in value-added tax for Portuguese restaurants and other catering services. In 2012 the tax increased from 13% to 23% and it was brought back down in July of 2016. Combining data on all non-financial firms in Portugal between 2006 and 2017 we estimate effects upon four agents: workers, firm-owners, suppliers and consumers. Through a Difference-in-Differences strategy we find that: the tax increase did not harm employees as severely as firm's margins, leading employers to later pocket most of the tax cut benefits. Also, firm-owners pass onto consumers around 40% of the VAT increase while the pass-through after the repeal is zero.

Keywords Value-Added Tax, VAT, Restaurants, Portugal, Fiscal Policy, Difference-in-Differences, Consumption Taxes

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1 Introduction

The value-added tax (VAT) established itself across most developed countries as an important source of revenue for the State. Very often, governments make use of this consumption tax to adjust imbalances in national budgets. In 2011, Portugal's public accounts did not resist the financial and economic crises and, on April 7^{th}, Portugal requested financial assistance from the European Union and the International Monetary Fund (*IMF*). On May, 17^{th}, a three years Economic Adjustment Programme, negotiated between the Portuguese government, European Institutions and the IMF, was adopted by the Eurogroup. The Memorandum of Understanding had three main pillars: structural reforms, the banking sector and fiscal consolidation. In the context of the third pillar, the right wing coalition in government[1] made use of VAT to enhance public revenues in 2012. Purchases in Restaurants and other Catering Services, until then subject to the intermediate VAT rate (13%), became taxed at the standard rate (23%). An unpopular decision amongst market agents which was at the core of the following electoral campaign, with the socialist party committing for its repeal.

Four and a half years later, by July 2016, the socialist government[2] repealed the VAT increase. *"The decrease in the VAT rate was based on the Government's commitment to promote greater dynamism and boost employment in a sector of great relevance for the national economy and with a large capacity for job creation"*, the government argued[3]. This repeal brought a tax break to a sector employing around 6% of the workforce whose VAT contributions surrounded 2% of total VAT revenues.

Later, in an assessment report compiled by the Portuguese Government and the National Association of Lodging and Catering Services[4] published on March 2019, the counter-reform was considered a success. [5]. It is argued that in the 18 months after July 2016, employment in the sector increased 7.9%, social security contributions rose 12% despite VAT revenues decreasing 38% (385 million euros).[6] These percentages were by far larger than for the rest of the

[1] Social Democrats and People's Party governed from October 2011 until October of 2015

[2] In the government since October, 2015)

[3] The socialist program aimed at pursuing *"Active employment policies for sectors of tradable goods and for industries with high potential for job creation"*.

[4] *AHRESP – Associação de Hotelaria, Restauração e Similares de Portugal*.

[5] The Focus Group was created by dispatch n.º 8591-C/2016 (2019)

[6] From Jan'15 to Jun'16 VAT revenues decreased from 1004.4M euros to 619.1M.

economy, thus the report considered that aggregate benefits outweighted the reform's costs and labelled it as a crucial moment for the sector.

This paper revisits these results by resorting to state-of-the-art counterfactual techniques. We instrument VAT changes to assess tax incidence upon four agents: consumers through market prices; employees through employment and average wages; firm-owners through business margins; and finally suppliers through cost of materials. Firstly we explore the 2012 tax increase, study a few of its empirical patterns, and then we dig into the 2016 repeal searching for possible symmetries of the effects upon market agents. It is the purpose of our study to contribute to a growing literature on public finance documenting non-standard reactions towards consumption taxes. For that we rely on a high-quality firm dataset, IES[7], containing information on all enterprises in Portugal and allowing us to go beyond most current literature by assessing effects on outcomes other than prices.

We find an asymmetric pass-through in prices. While in 2012 firm-owners passed onto consumers around 40% of the tax increase in 2016 the repeal did not caused a reduction in prices. Meanwhile employees, in 2012, faced a 3% and 3.7% reduction in employment and wages, respectively while firms accommodated the tax increase with a reduction of 25% of their gross value-added. In 2016, the counter-reform showed some symmetries for employment and value-added while it didn't benefit employees through wages. Herewith, the repeal favoured capital instead of labour as the former had been relatively more sacrificed by the initial reform.

The remainder of this paper is organised as follows. Section 2 focuses on the institutional background of the reforms, giving an insight on VAT's economic theory and the Portuguese setting of the reform. We present our literature review, identification strategy, data and results in Sections 3; 4; 5 and 6, respectively. In Section 7 we compute a set of robustness checks, in 8 we analyse the 2016 repeal and in 9 we explore the effects on the intensive and extensive margin. We then conclude this paper with a summation of our findings and paving the way for future research on the topic.

[7]Informação Empresarial Simplificada.

2 Institutional Background

Colm and Musgrave (1960), broke down government's main economic functions. National institutions should seek economic stabilization by promoting full employment, economic efficiency by designing taxes to raise revenue in the least distorting way, and ultimately, attain a fair distribution of income. Optimal taxation and government's performance are therefore linked, as public revenue is a government's main tool.

Diamond and Mirrlees (1971), restricted the set of goods to which taxes ought to be applied. The authors argue that in all intermediate goods the optimal tax should be zero. For them, regardless of the allocation of final goods, production efficiency requires the absence of any tax that induces asymmetric effects across industries. This way the social planner prevents himself from introducing distortions within markets. Also on production efficiency, Atkinson and Stiglitz (1976), add another restriction to consumption taxes. They argue that optimal taxes should be equal across all final consumption goods since redistribution is already done through income taxes. Therefore, if consumers' choices are undistorted the disincentives of achieving redistribution are minimized.[8] Mankiw et al. (2009), argue that, in practice, policy makers have already internalized most of these authors' optimal taxation theories. For example, the previous contributions have driven favourable arguments for deductible value-added tax for firms, thus exempting intermediate inputs.

To achieve optimal taxation and avoid distortions, the International Monetary Fund advises countries to undergo minimal exemptions and set a single VAT rate. This is the least distorting way of raising revenue. Creating differentiated rates not only introduces distortions but also disregards potential revenues. For instance, in 2016, Portugal lost more than half of its potential VAT revenue in exemptions, reduced tariffs or merely poor enforcement, resulting in a VAT ratio of 49%, OECD (2016).

Contrary to the *IMF* and optimal taxation theory, the EU Commission is more flexible and recommends a standard tariff between 15% and 25% with room for reduced tariffs. Many authors consider this flexibility crucial to address equity concerns. They argue that an universal rate makes VAT regressive since low income families spend a larger share of their income on

[8] This, nevertheless, excludes goods whose production generates externalities.

VAT expenses, Bikas, E. & Andruskaite (2013). Today, many countries in the EU exempt basic goods by having implemented multi-rate VAT structures, Lejeune (2010).[9]

In practice, the value-added tax importance has increased amongst developed countries. While in 1990 it was present in 47 countries, 25 years later the number nearly tripled, with 140 countries having a value-added tax, Pomeranz (2015). Researchers have explored many reasons for the globalization of VAT (Keen and Lockwood (2010); Ebeke and Ehrhart (2011); Claus (2013); Lejeune (2010)), nonetheless, two main reasons stand out.

Firstly, the "revenue enhancing capacity" of the value-added tax, Ufier (2014). The natural experience here in question is a perfect example of it. Following the VAT increase, state revenue more than doubled in one year.[10] This "money machine", Keen and Lockwood (2010), is crucial for any government to enhance tax revenues anytime they face budget constraints. Alternatively, whenever budget commitments become less of a problem, all the extra revenue gathered could be put to the disposal of lower income classes through enhanced social programs. Many governments have done it, illustrating VAT's capacity to reduce the marginal cost of public funds, Keen and Lockwood (2010). Alternatively, the overall increasing trends in value-added tax tariffs is sometimes said to be the main driver for enhancing VAT revenues, Bikas and Raškauskas (2011).

Secondly, its implementation mechanism prevents tax evasion. The VAT structure facilitates enforcement by generating third party information and paper trail. The right to deduct VAT on input creates a chain mechanism which is crucial for tax authorities to enforce compliance (Keen (2013); Slemrod (2007); Pomeranz (2015); Jenkins and Kuo (2000)).

2.1 The Portuguese VAT Reform

In July 2010, Portugal was facing a major economic and financial crisis and to enhance public revenues, standard VAT rates increased from 20% to 21%, intermediate rates from 12% to 13% and reduced ones from 5% to 6%. In January 2011 the standard rate increased again to 23%. However, this was not enough to sustain the sovereign debt crisis and in May it signed a Memorandum of Understanding with international institutions for an Economic Adjustment

[9] See Appendix A.6 on different VAT rates for catering services across the EU.

[10] Revenue increased from 241 million euros in 2011 to 521 in 2012. Source: Portuguese Tax Authority.

Program. One of the conditions was eliminating intermediate rates on catering services and therefore, in January 2012, the value-added tax for the catering services sector was increased to the standard level, 23%. This tax reform marks the first moment of our experimental setting, the VAT increase from 13% to the 23%.

In September 2013 *AHRESP* published a report stating that the VAT increase for restaurants led to a loss of 34 million euros of revenue in 2012 and *"Therefore the government should repeal the increase, reducing VAT from 23% to 13% in order to promote employment."*. Their view was that a tax windfall on firms of the sector would allow aggregate demand to increase due to lower prices and allow business owners to invest, increase employment and/or wages. A view shared by the Socialist Party, who, in July of 2016, repealed the VAT increase. This is the second moment of our experimental setting, the decrease of VAT for catering services from 23% to 13%.

3 Literature Review

Empirical research on the effects of VAT changes is not widely developed on outcomes beyond prices. Benzarti and Carloni (2019), evaluated a VAT decrease in France for sit-down restaurants from the standard rate (19.5%) to the reduced rate (5.5%). The authors explore effects of the policy over four groups: firm-owners, employees, consumers and suppliers of material goods. Their findings suggest that firm-owners pocketed more than half of the tax break. Consumers, employees and suppliers shared the remaining benefits.

Also looking at price effects Carbonnier (2007) investigated two large VAT windfalls in France. Firstly, for brand new cars in 1987, secondly, for housing repair services in 1999. The author finds that price effects depend on the sector according to the market's degree of competition. For cars the benefits passed onto consumers are higher than in house repair services since the latter operates almost in a perfectly competitive market preventing firm-owners to deliver larger pass-through to prices. In oligopolies, such as cars retail, Carbonnier argues that firms pass-through larger benefits to consumers because previously the firms had already been capturing a larger share of consumers' surplus.

Kosonen (2015) measured the effects of a 14 p.p. VAT decrease (from 22% to 8%) for

hairdressing services in Finland in January of 2007. The author documents effects over prices and firms' turnover and estimates that prices were only cut in half of what a full pass-through would have implied. Kosonen also finds that firms tend to increase their margins and concludes that *"the deadweight loss to tax revenue makes the reform look inefficient policy"*. Benzarti et al. (2017), explored the same reform. Despite only investigating price effects, they extend their analysis beyond the moment of the repeal, January 2012. Their findings suggest that the direction of VAT reforms must be accounted in order to achieve redistribution as they induce asymmetric responses over prices. This points towards a gap on the standard tax incidence theory which treats VAT increases and decreases the same way. They document asymmetric pass-through on Finnish hairdressing services' prices and find that equilibrium prices after treatment are higher than before.

4 Identification Strategy

All catering services, restaurants / bars / cafeterias / canteens, etc. faced the 10 percentage points (p.p.) increase in the value-added tax in 2012, thus they constitute our treatment group. [11] Our control group are food retailers, a labour intensive service which includes butchers, bakeries, fishmongers, convenience stores that predominantly sell food items, etc. [12] VAT rates apply over commodities rather to activities and therefore it is of negligible importance the kind of service each establishment provides. Food retail is a natural control group for restaurants as it is its closest substitute service. Nevertheless, we complement the analysis with two other control groups in Section 7. One may argue that during the last decade there were major developments in tourism dynamics. Since these are likely to disproportionate affect our treatment and control group, we use accommodation services as a control to account for these dynamics. Moreover, in 2013 the government created incentives to reduce tax evasion in several sectors, including catering services. This might have influenced the behaviour of treated firms and so we consider a third control group, hairdressers and beauty salons which were also subject to the new incentives.

[11] Henceforward, for simplification purposes, these will be referred as restaurants.
[12] See Appendix A.1 on Sector's Composition.

We implement a Difference-in-Differences (DiD) fixed effects (FE) regression, where we build a counterfactual for the evolution of our treatment group. This specification follows the approach of Benzarti and Carloni, (2019):

$$logY_{itc} = \beta_0 + \beta_1(\textit{Treat}) + \beta_2(\textit{After}) + \beta_3(\textit{Treat} \cdot \textit{After}) + \pi_t + \omega_i + \epsilon_{itc} \tag{1}$$

Equation 1 is our main specification. *After* is a dummy variable, 1 if $_t$ belongs to post-treatment period, between 2012 and 2015, or 0 otherwise. *Treat* is also a dummy, equals 1 if firm $_i$ operates in the catering services sector or 0 otherwise. This specification includes year and firm FE, the former, π_t, controls for differences across years common to both groups, the latter, ω_i, for firm characteristics constant over time. *Y* represents outcomes of interest and standard errors are always clustered at municipal level, represented by $_c$.

A DiD strategy identifies the interaction term *After* · *Treat* as an estimated average effect of a reform upon each outcome Y_{itc}, given by β_3 in equation 1. This paper uses the DiD setting to explore treatment effects over 3 market agents: workers, through employment and wages; firm-owners through gross value-added (GVA) and finally, suppliers by exploring the cost of materials as a percentage of turnover, to capture the cost of each euro sold by restaurants.[13] Additionally, we investigate price effects over consumers without following the DiD approach.

Equation 1 is our main specification, nonetheless we compute 2 others in our baseline results. A second specification which includes year FE and covariates to control for firms characteristics, and a third one that drops both FE and only uses the covariates interacted with a treatment status dummy.

We further extend the model with a "time-event study" to estimate average dynamic effects of our discrete shock - tax increase. Augmenting the model allows to evaluate the persistence of mean effects. So, between 2006 and 2015 the following model is used:

$$logY_{itc} = \sum_{\upsilon=-\kappa}^{p} \eta_\upsilon \cdot \textit{Treat} \cdot 1\{t = \upsilon\} + \pi_t + \omega_i + \epsilon_{itc} \tag{2}$$

υ is an index for years before the 2012 policy while p represents the years after VAT increases.

[13] See Appendix A.3 for descriptive statistics on these variables.

Series are normalised to the period prior to treatment, imposing $\eta_{2011} = 0$. Depicting dynamic effects shows mean impacts throughout the medium-run and also possible anticipating behaviours prior to the reform. Always assuming that, in case of no policy change, differences between groups would have remained the same as in 2011. Ultimately, they represent, the percent change in production factors every year relative to 2011.

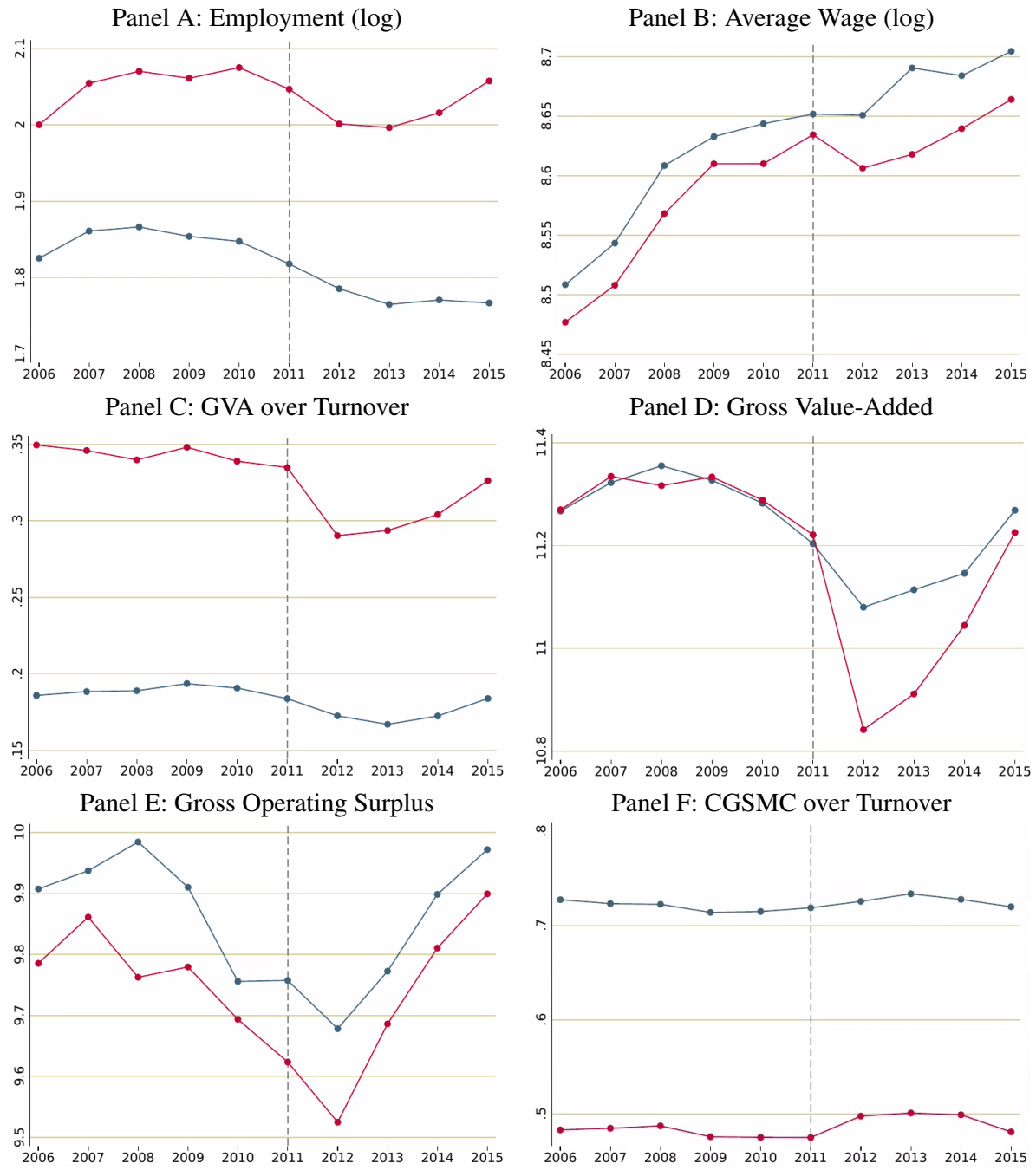
5 Data

The DiD framework uses annual firm-level balance sheet data from IES - *Informação Empresarial Simplificada* to assess effects on production factors. It includes information on all non-financial corporations in Portugal. We focus on active firms with at least 3 employees and with positive turnover and gross value added. We only explore firms "in activity" status as "leaving the market" induces measurement errors due to case specific behaviours. Firms in the autonomous regions of Madeira and Azores are left out as the islands face different value-added tariff rates. Firms with non-sequential observations are ignored, and it is required that firms have a unique spell of information reported between 2006 and 2017. Overall, we use slightly above 105 thousand observations.

This experimental setting splits our paper into 2 periods. Section 6 analysis the VAT increase, 2006 to 2015 with a cut-off at December 2011, exploring information of 8391 treated firms and 1802 food retailers. Afterwards, on Section 8, we focus on the counter-policy, 2012/17 with a cut-off at June 2016. Here we count on 9356 catering services and 1882 control firms.

In Subsection 6.2 we use monthly non-seasonally adjusted prices on commodities from Eurostat's Harmonised Indices of Consumer Prices (HCIP) to explore VAT pass-through on prices. Data is sorted by COICOP (Classification of Individual Consumption by Purpose), collected through surveys on each member state of the union. All series are harmonized, thus accounting for country specific sampling procedures.

Figure 1: Trends for Outcomes of Interest



Notes: Figure 1 displays trends for outcomes of interest between 2006 and 2015. Treatment group, Restaurants, is represented by the light red series while Food Retailers are depicted in the blue series. 2011 represents our cut-off, the period immediately before the reform.

Table 1: Mean Differences - Restaurants w/ respect to Food Retailers

	Mean of Treatment Group	Mean of Control Group	Difference
EBITDA / Turnover	0,039	0,034	0,005*
Equity / Total Assets	0,10	0,312	-0,2095**
Quick Ratio	1,90	1,85	0,54
Turnover (log)	12,5	13,16	-0,6971**
GVA (log)	11,3	11,33	0,0003
GOS (log)	9,78	9,911	-0,1311**
Firm's Age	18,3	16,4	1,87*

Notes: Table 1 presents mean differences for firms' characteristics (our covariates) for 2006 - 2011.[14]

5.1 Empirical Approach

Any DiD setting hinges on the crucial assumption that the unobserved heterogeneity between treated and non-treated firms is time-invariant and should cross-out when computing double differences. If this is our case, food retailers dynamics should represent catering services in absence of the reform. Therefore, pre-treatment trends of both groups ought to be parallel. In Figure 1 we test the validity of this assumption. The logarithmic form of gross operating surplus, which we explore in Subsection 6.3, is the most questionable trend. The parallel trend assumption is verified for the remaining outcomes of interest and so it is possible to derive causal inference on the impacts of the reform.

Additionally, in this experimental setting the VAT reform is considered a natural shock from the perspective of both firms and consumers. It was a requirement of the Financial Assistance Programme and this guarantees random treatment assignment. This natural experiment was inserted within a challenging period of the Portuguese economy, yet, no reasons lead us to believe that the treatment group was subject to different market dynamics than our control group beyond the ones our empirical strategy aims to control. Both sectors are close substitutes and constituted by firms of similar nature: small-labour intensive businesses with low-qualified workforce[15]. Table 1 presents mean differences between catering services and food retailers during pre-treatment, 2006-11. Column 3 shows some inherent differences across the two groups which is why is fundamental to include firm FE in our main model (Equation 1).

Ultimately, the dynamic effects depicted by equation 2 also require the absence of anticipa-

[15]Control and Treatment group are also similar in pre-treatment price, see Section 6.2

tory behaviours. The VAT increase from 13% to 23% was approved on the 29^{th} of November 2011 in the Portuguese Parliament while it only had been announced weeks before. This way, any anticipatory behaviours would have only impacted the last trimester of our annual administrative data. Therefore, we can disregard this possibility.[16]

6 Results

The following section presents our results for the first policy change, the VAT increase in 2012. We address aggregate effects upon production factors, following the DiD approach, and then complement the analysis with the event-time study to explore dynamic effects and see whether the impacts were temporary or long-lasting. Afterwards, we look at Eurostat's price series to measure pass-through onto consumers.

6.1 VAT Increase on Production Factors

Table 2 presents DiD estimates for mean treatment effects where each panel represents a different specification. Column (1) and (2) represent effects on employees, columns (3) and (4) over firm-owners and column (5) depicts the burden upon suppliers.

Focusing on workers, our main specification in Table 2 provides statistically significant evidence of a reduction in the number of employees as well in wages, 3.2% and 3.7%, respectively. However, the remaining specifications deliver positive estimates for employment, contradicting economic theory of tax increases and decreasing the robustness of our findings. Wage effects are consistent under multiple specifications and therefore we can conclude that the 10 p.p. VAT increase had a strong impact over workers through their wages. In fact, the event-study (Figure 2) shows clearer effects over wages (Panel B) than over employment (Panel A), either in magnitude or dispersion against the pre-treatment trend.

Secondly, column 3 indicates that the value-added of each euro sold, given by the Mark-Up Ratio ($\frac{G.V.A.}{Turnover}$), decreased on average 3.3 percentage points. These results are also significant using specifications B and C. However, Panel C of Figure 2 shows inconclusive dynamic effects

[16] Subsection 6.2 studies monthly price variations and we find no anticipatory behaviours.

Table 2: DiD Estimates of the VAT Increase Using Food Retailers as Control

	Number of Employees (log) (1)	Average Wage (log) (2)	Mark-Up Ratio (3)	Gross Value Added (log) (4)	CGSMC Ratio (5)
Panel A - Firm & Year FE					
After·Treat	-0.0322***	-0.0369***	-0.0325***	-0.245***	0.016***
	(0.00939)	(0.00795)	(0.00197)	(0.0192)	(0.0017)
Panel B - Controls & Year FE					
After·Treat	0.0302***	-0.0247**	-0.0163***	-0.122***	0.003***
	(0.00638)	(0.008)	(0.0025)	(0.0190)	(0.0012)
Panel C - Controls w/ time interactions					
After·Treat	0,0492*	-0,0268*	-0.0123***	-0,117***	-0,001**
	(0.00872)	(0.0112)	(0.0025)	(0.0188)	(0.0025)
Obs.	77215	76903	77215	77215	77215

Notes: Table 2 shows mean treatment effects for the VAT increase of 2012. All outcomes are in logarithmic form except for Mark Up (GVA) and CGSMC, both ratios of Turnover. Panel A is our main specification with year and firm fixed effects. Panel B includes year FE and controls for firms characteristics. Lastly, Panel C drops both FE and only uses the same controls as B this time interacted with a treatment status dummy. Standard errors are clustered at the municipality level. *-p¡0.05; **-p¡0.01; ***-p¡0.001

on the value-added of each euro sold. Additionally, we also explore a financial aggregate, GVA in its logarithmic form, which is the difference between a firm's output and its intermediate consumption. Column (4) suggests that GVA was severely hurt by the tax increase. Our main estimates is that, on average, firms' value-added decreased 25% in 2012. These estimates are supported by the remaining specifications and by the event-time study as Panel D of Figure 2 depicts immediate and meaningful effects upon GVA.

Lastly, we use weight of materials' cost over firm's turnover to measure impacts on suppliers. Here, it is not possible to attribute a mean treatment effect as our estimates have different signs. Anyhow, a negative estimate of 1 p.p. presented in Panel A would mean that cost of materials decreased or simply increased less than restaurant's turnover. However, the next subsection shows that catering services experiencer high inflation in 2012 which might impacts our turnover values, so our estimates here may suffer from some measurement error. This may legitimate differences across Panels and the tender effects showed in Panel F of Figure 2.

Overall, our DiD estimates point towards meaningful and negative impacts over wages and firm's margins while our conclusions for employment and suppliers sold are less robust.

6.2 Effects on Prices

The 23% VAT remained upon catering services from January 2012 until July 2016. In this subsection we explore the effects over consumers through prices. We leave the DiD setting to assess symmetries between both policies using monthly data on prices.

Consumer prices include both the VAT and the producer's price. The proportional change in final prices is given by the relative change of the difference in post and pre-reform prices and the pre-reform price. Thus, a 10 p.p. VAT increase translates into a 8.85% increase.[17] The corresponding calculations for the repeal deliver a 8.13% decrease in prices. These percentages represent how much prices would have changed in case of full pass-through - dashed line in Panel B of Figure 3.

Essentially, five empirical patterns emerge from Figure 3. Firstly, Panel A displays a discontinuous hike in prices in 2012. A 3.5% increase in prices, two months into the VAT reform[18]. Secondly, this hike represents a pass-through around 40%, meaning that firms pass onto consumers almost half of the additional VAT burden through higher prices - Panel B. This goes against the argument of the existence of any adjustment friction either driven by menu costs or capacity constraints. Third, after the repeal the pass-through is almost non-existent as it is not observed any drop in prices.[19] Clearly, firms pocketed the tax windfall leaving consumers untouched.

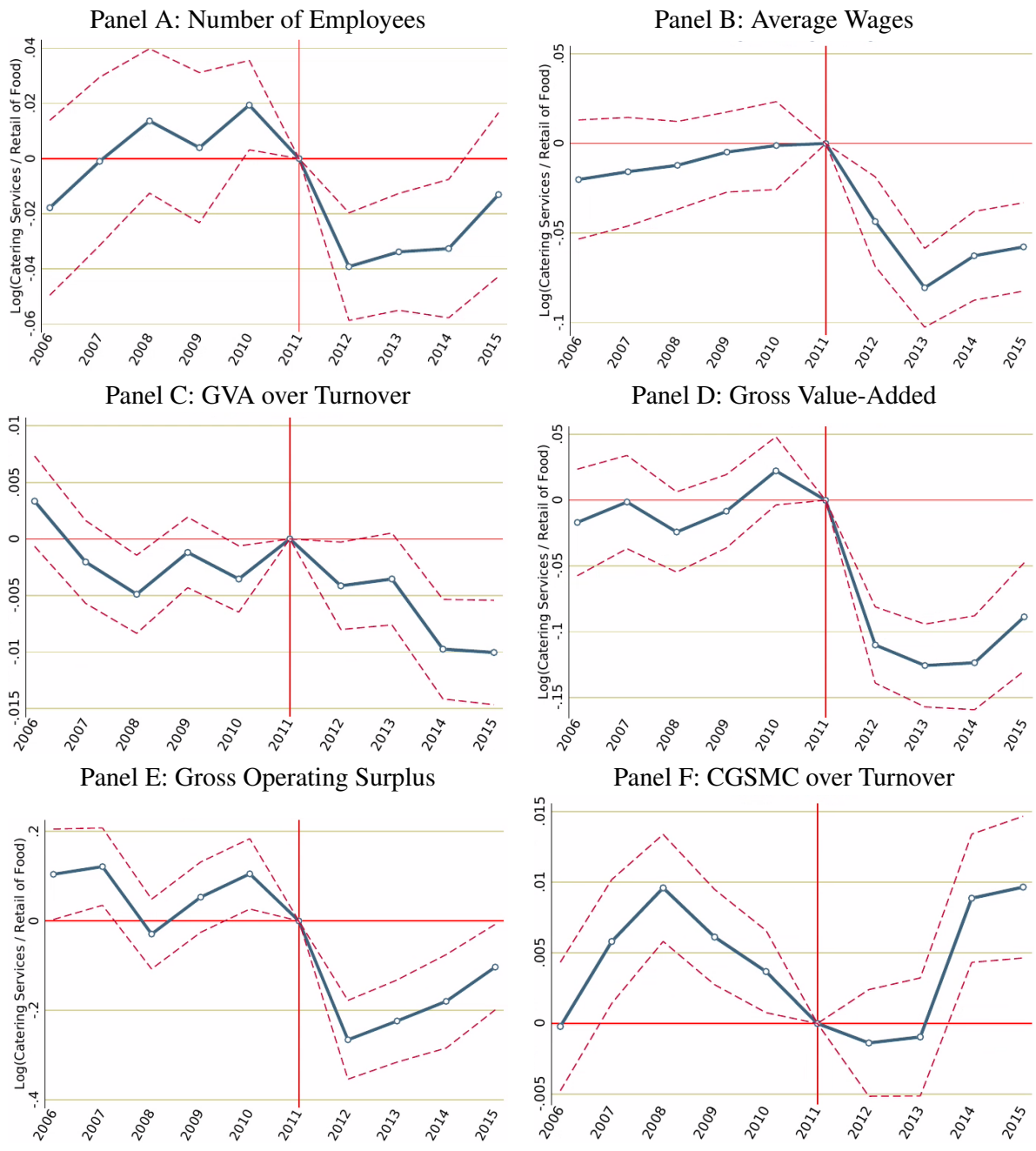
Fourth, prior to 2012, food items sold in retail stores faced a reduced VAT rate of 6%, this remained unchanged throughout our treatment period. Panel C depicts similar and fairly parallel time trends before 2012 for both groups, so food retail is also a natural control group in prices. Yet, after VAT of treated firms is brought back to its intermediate level (13%) there are no signs of convergence, revealing an asymmetric response to a temporary reform whose effects held on the medium run. Finally, Panel D shows log-differences between prices in both groups. Two

[17] $\frac{(1.23_{Pafter} - 1.13_{Pbefore})}{1.13_{Pbefore}}$

[18] 2.8% in January, accumulating 4.86% throughout 2012

[19] Right-hand graphic in Panel A and right-hand vertical line in Panel B of Figure 3

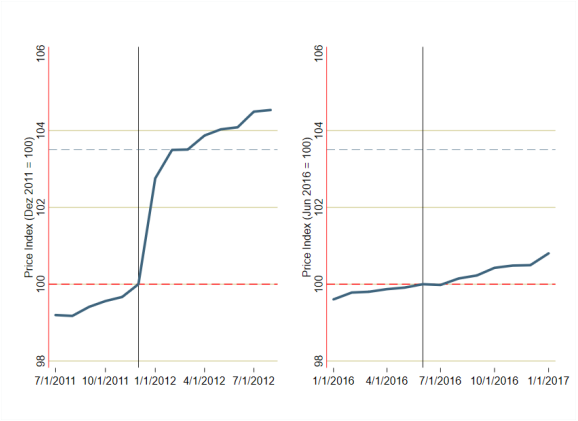
Figure 2: Event-time Estimates: Dynamic Effects of the VAT Increase



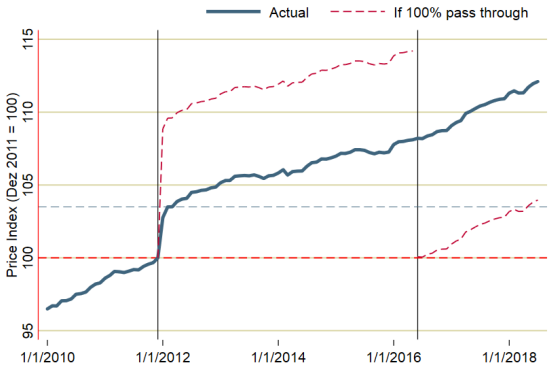
Notes: Adding lags and lead to the main specification we compute event-time coefficients for production factors. These include firm and year fixed effects and dashed lines represent 95 percent confidence intervals. Panel E is analysed in Subsection 6.3.

Figure 3: Effect of VAT reforms on Prices

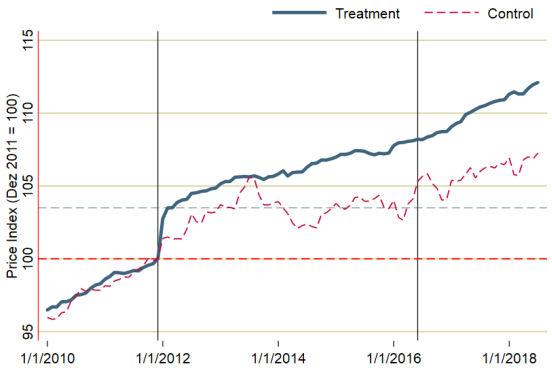
Panel A: Price of Restaurants



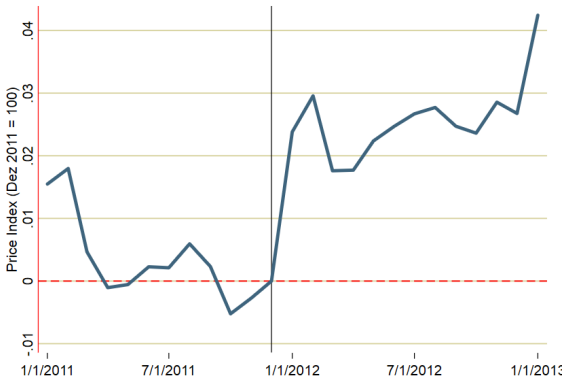
Panel B: Prices Under Full Pass-Through



Panel C: Prices of Restaurants and Retail



Panel D: Log-Difference in Prices



Notes: Panel A shows actual prices for restaurants; Panel B depicts counterfactual prices in case of full pass-through with a 8.85% hike in prices in January 2012 and -8,13% in July 2016; Panel C shows prices of food retailers as a counterfactual of restaurants, using monthly Eurostat data; Panel D was computed based on author's computations of log-differences between prices in restaurants and food retailers. For graphical clarity composite prices are normalized to 100 in the period immediately before the primary VAT reform, December 2011. Periods preceding VAT reforms are represented by vertical lines.

months following the reform, restaurant prices had increased around 3% relative to retailers' food, hiking up to 4% by the end of 2012. An immediate, meaningful and persistent effect.

These empirical patterns are consistent with literature on asymmetries of price responses to tax changes. We find asymmetric price effects where a pass-through to consumers is only verified to make them bear the tax increase. The absence of a reduction in prices following the repeal is consistent with the argument against reduction of consumption taxes to boost aggregate demand through lower prices as, ultimately, producers pocket the tax windfall.

6.3 Distributional Effects

There is an important empirical pattern which is worth mentioning. The gross value-added (GVA) is the difference between a firm's output and its intermediate consumption. On the other

hand, the Gross Operating Capital (GOS) is the remuneration of the production factor capital, this one is given by GVA deducted of Employees Expenses (EE) and being a simple financial measure in many cases is actually negative. This is the case for some of our treated firms as these are labour intensive services. Aware that gross value-added is given by $GOS + EE$, where the former is capital and the latter, labour, it is interesting to assess how our estimates for value-added are impacted through each of these factors.

We replicate Eq. 1 for GVA, GOS and EE, excluding firms with negative operating surplus[20] and present the results in Table 3. These show that for this subsection of restaurants the effect for GVA is lower, meaning that firms with negative operating surplus were responsible for a negative bias or around 15 p.p.. Additionally, we show that treatment decreased GOS in 25% and EE in 7.5%. Capital was relatively more impacted than labour. However, restaurants are labour intensive and in 2011 EE represented on average 80% of restaurants' GVA while capital (GOS) was just 20%. Thus, by multiplying this proportion by each factors' mean effect it is obtained an average effect over GVA of -0.049 for capital (GOS) and -0.6 for labour (EE). Their sum totals -0.109 which is very close to our GVA estimate for this subsample (-0.107).

Therefore, firms with a positive operating surplus suffered a reduction of 10.7% in GVA with the VAT increase, where 5% was due to a decrease in capital margins and the remaining 6% to labour effects.

Our overall results own several natural limitations. Throughout the experimental setting, tourism skyrocketed, tax evasion decreased and firms entered and left the market. Despite our results being rather convincing, we take this research a little further to guarantee them more robustness.

Table 3: Excluding Firms with Negative Operating Surplus

	G. Value-Added (log)	G. Op. Surplus (log)	Employees Exp. (log)
	(1)	(2)	(3)
After x Treatment	-0.107***	-0,249***	-0.075***
	(0.0142)	(0.0325)	(0.0129)
Obs	53359	53359	53359

[20]Our previous results already excluded firms with negative GVA and there are no firms with negative EE.

7 Robustness Checks

We compute several robustness checks: (1) exclude top ten most touristic municipalities to control for tourism dynamics; (2) replace food retailers by hotels as another way of controlling for tourism; (3) use hairdressers and beauty saloons to control for the implementation of "e-fatura" and (4) a placebo test. We estimate effects over workers, firm-owners[21] and suppliers using Equation 1, our firm and year FE specification.

7.1 Touristic Boom

We control for the changing dynamics in tourism over the last decade in two ways. Firstly, we replicate the difference-in-differences setting excluding firms located in top 10% most touristic municipalities of continental Portugal[22]. Afterwards, we using a replace our control group by establishments of the accommodation sector (this second robustness check includes all municipalities).

7.1.1 Excluding Touristic Municipalities

Table 4 uses Food Retailers as a control group and presents DiD estimates for treated firms outside the top 10% of most touristic municipalities.

Our previous empirical patterns remain the same. Firms' margins were severely hurt by the reform of 2012, workers faced a decrease in employment around 3.7% while wages experienced a change of -4%. Columns (3) and (6) show that the value-added per euro sold decreased 3 p.p. and the cost of each euro sold increased 1.6 p.p. There is almost a perfect overlap with the previous results.

7.1.2 Changing Control group

Excluding touristic municipalities controls for some dynamics brought by foreigners on the local economy, nevertheless, while the relationship between restaurants and tourists might come as immediate, it is not that clear the link between those tourist and our control group, food

[21] Using only Mark-Up & GVA to measure effects on employers because we don't explore distributional effects.
[22] Data retrieved from PORDATA. See Appendix A.4.

Table 4: DiD Estimates Excluding top-10% municipalities with more tourists

	Employment (log) (1)	Avg. Wages (log) (2)	Mark-Up Ratio (3)	G.V.A. (log) (4)	CGSMC Ratio (5)
After·Treat	-0,0373***	-0,0406***	-0,0313***	-0,255***	0,016***
	(0,0105)	(0,00888)	(0,00219)	(0,0219)	(0,002)
Obs	36954	36801	36954	36954	36954

retailers. Therefore, we perform the same Dif-Dif methodology with a different control group, hotels or any lodging establishment. This group is composed of 1410 firms representing a total of 10707 observations. Results are presented in Table 5 with the same specifications as Table 2.

Changing the control group makes our estimates for employees inconsistent, either for employment or wages. However, our empirical evidence for firm-owners and suppliers remains stable. Gross value-added decrease 23.7% and so did their margins since cost of materials increased as a percentage of sales (2.3 p.p.).

Table 5: DiD Estimates of the VAT Increase Using Hotels as Control Group

	Employment (log) (1)	Avg. Wage (log) (2)	Mark-Up Ratio (3)	G.V.A. (log) (4)	CGSMC Ratio (5)
After·Treat	0.0152	0.0158*	-0.0187***	-0,237***	0,023***
	(0,012)	(0,0075)	(0,0027)	(0,019)	(0,002)
Obs.	74315	74049	74315	74315	74315

7.2 E-fatura

In 2013 the Portuguese Government created an incentive against tax evasion through e-fatura, an online platform which registers all purchases if customers require a receipt with their tax number. With the incentive, customers gained deduction rights on their annual tax return according to the VAT borne in purchases of several commodities throughout the year. These commodities included meals in restaurants, our treatment group, along with repair of vehicles and hairdressers, sectors with a natural propensity for tax evasion.

Since firms might have adapted to greater enforcement from tax authorities, we use again a different control group, hairdressers and beauty saloons to account for this policy. Table 6

Table 6: DiD Estimates of the VAT Increase Using Hairdressers as Control

	Employment (log) (1)	Avg. Wage (log) (2)	Mark-Up Ratio (3)	G.V.A. (log) (4)	CGSMC Ratio (5)
After·Treat	0.055*	0.009	-0.034***	-0.134***	0.021***
	(0.0125)	(0.0122)	(0.0045)	(0.0271)	(0.0029)
Obs.	70566	70264	70566	70566	70566

presents the results. Column 1 and 2 contradict our main estimates and reveal the same pattern as Table 5, employment and wages were not severely hurt by the tax increase. On the other hand, these results support our previous findings for firm-owners and suppliers. The first were very affected by the reform while the latter managed to increase their share of restaurant's turnover.

7.3 Placebo Test

Finally, we compute a placebo test instrumenting 2009 for an hypothetical VAT reform, where the pre-treatment period is 2006/08 and 2009/11 is post-treatment. Note that July 2010 all VAT rates increased one percentage point, but since the increase was common to all tariffs, goods and services this shall have no impact upon our estimates. Table 7 presents the results and shows that no major significant effects were found by simulating a reform.

Table 7: DiD Estimates of a Placebo Test - VAT reform in 2009

	Employment (log) (1)	Avg. Wage (log) (2)	Mark-Up Ratio (3)	G.V.A (log) (4)	G.O.S. (log) (5)	E.E. (log) (6)	CGSMC Ratio (7)
After·Treat	0.01	0.00943	-0.0032*	0.0062	-0.03	0.0168	-0.00017
	(0.0085)	(0.0079)	(0.0014)	(0.0126)	(0.0256)	(0.0097)	(0.0015)
Obs.	45272	45133	45272	45272	35440	45272	45272

8 VAT Repeal

In July, 2016, VAT for catering services decreased from 23% to 13%. Following the same DiD approach we now measure this policy's effects and search for possible symmetries to the VAT increase of 2012. Thus, pre-treatment period becomes 2012/15 and post-treatment: 2016/17.

Table 8: DiD Estimates of the Repeal Using Food Retailers as Control

	Employment (log) (1)	Avg. Wage (log) (2)	Mark-Up Ratio (3)	G.V.A. (log) (4)	CGSMC Ratio (5)
Panel A - Firm & Year FE					
After·Treat	0.0246**	0.01	0,041***	0.280***	-0.022***
	(0.0079)	(0.0079)	(0.0002)	(0.0138)	(0.0014)
Panel B - Controls & Year FE					
After·Treat	-0,0152*	-0,013	0,025***	0,171***	-0.006***
	(0.0068)	(0.0079)	(0.0035)	(0.0274)	(0.0015)
Panel C - Controls w/ time interactions					
After·Treat	-0,035***	-0,0159	0.024***	0,156***	0,006
	(0.0088)	(0.0109)	(0.0028)	(0.0214)	(0.0023)
Obs.	56506	56260	56506	56506	56418

The low number of observations in the post-treatment period and the fact that this pre-treatment period coincides with the post-treatment of the initial VAT increase pose as 2 limitations of this analysis, therefore one must interpret these repeal estimates with caution.

In Subsection 6.2 we saw asymmetries over consumers and in Table 8 we observe the same for workers. DiD estimates for employment are lower than its absolute change in 2012 and for wages our estimates loose their significance. Thus, workers collected lower benefits than a perfect symmetry would have implied. On the otherhand, firm-owners benefits are larger than absolute change 2012. The value-added of each euro sold (Column 3) increased 4.1 p.p. and overall value-added (Column 4) increased 28% after the repeal. Despite margins being severely hurt in 2012 by the VAT increase, they increased after the repeal in a larger proportion. Ultimately, aware that their clients would be experiencing a tax windfall beyond July 2016, suppliers could have tried to expropriate some of these benefits. In which case the weight of producer's costs on restaurant's sales would have increased. The cost of each euro sold is given by Column 6 and our estimates are negative meaning that suppliers did not expropriate benefits from their clients.

These findings show some asymmetries following two symmetric VAT reforms. Despite firm owners being the most affected by the VAT increase they were also the main beneficiaries of its repeal, whereas employees collected almost non-existent benefits when they had been affected by the increase.

9 Intensive and Extensive Margin

The IES dataset allows us to distinguish effects on the intensive margin from the extensive margin of the market. These two tell us two different effects. The intensive margin measures how much more of a resource is used, employment might have increased because firms, already in the market, used the tax windfall to hire more. However, employment could have increased in general terms because more firms entered the market, in this case we are talking about the extensive margin of the market.

We evaluate the intensive margin by solely considering firms which were in the market 3 years before each reform and remained there 3 years after.[23]. In this regard, Table 9 shows that our previous empirical patterns remain stable. Workers collected lower benefits following the repeal than the costs they had born in 2012. Firm-owners are highly affected by both policies, collecting higher benefits in 2016 and suppliers did not collect benefits from their clients as their sales did not increase as a share of restaurants' turnover.

Table 9: Intensive Margin using Food Retailers as Control

		Employment (log)	Avg. Wage (log)	Mark-Up Ratio	G.V.A. (log)	CGSMC Ratio
		(1)	(2)	(3)	(4)	(5)
VAT Increase		-0,0442***	-0,0379***	-0,0328***	-0,264***	0.0159***
		(0,0084)	(0,0079)	(0,0019)	(0,0187)	(0,0017)
	Obs	37230	37074	37230	37230	37230
Repeal		0,0239**	0,0198**	0,0386***	0,267***	-0,022***
		(0,0077)	(0,0076)	(0,0017)	(0,0134)	(0,0015)
	Obs	39247	39087	39247	39247	39247

The extensive margin evaluates whether more or less resources are put to work, if firms enter/leave the market in our case. Following the VAT increase, number of restaurants decreased 4.7% while food retailers increased 1.1%, in 2012. After the counter-reform, restaurants increased 8.8%, twice as much as food retailers.

Here, we explore possible "Cleansing Effects", that is, if VAT made worst performing firms to quit in 2012 and, if after the repeal, new Restaurants were better than those already in the market. Table 10 shows that increasing VAT caused low-performing firms to leave the market. There was a cleansing effect since these firms, on average, had: lower number of employees,

[23] After the repeal we only consider 2 years – 2016 and 2017 - due to data limitations.

lower wages, almost a third of other's sales and a negative gross operating surplus. On the other hand, in 2016 this effect is not verified. Firms entering the market are smaller, pay lower wages, have lower sales and also a negative GOS. However, these are brand new firms and therefore these conclusion should not be as straightforward as the previous.

Table 10: Cleansing Effect

	Number of Employees	Average Wage	Turnover	G. O. S.
Dropouts'12	8.11	4 996	189 923	-20 979
Remainers'12	14.25	6 189	492 192	12 435
Arrivals'16	6.94	4 600	173 775	-4.05
Incumbents'16	14.54	6 534	572 049	55 995

10 Conclusion

This paper uses a large VAT reform in Portugal to shed light upon the effects of a temporary VAT increase. In January 2012, VAT for restaurants and catering services increased from 13% to 23% and so, through a Difference-in-Differences methodology, we build a counterfactual for the evolution of this treatment group. We explore treatment effects over 4 agents: consumers, workers, firm-owners and suppliers. We complemented our analysis with dynamic effects, distributional effects between labour and capital and studying possible symmetries following the counter-policy which occurred in July, 2016.

We find asymmetric price responses to symmetric VAT changes. Firstly, firm-owners passed onto consumers 40% of the total burden of the 2012 VAT increase whereas in 2016 there was no evidence of a reduction in prices. In 2012, workers faced wages reductions around 4% whereas employment effects were limited. These employees in 2016 collected very little benefits. Firm-owners were highly affected by the VAT increase - GVA decreased 25% - due to a relatively higher erosion of capital (gross operating surplus) compared to labour (employment expenses). Suppliers, despite the high inflation verified in catering services in 2012, managed to increase their goods value relatively to restaurant's sales, yet they were unable to expropriate benefits from the tax windfall upon their clients in 2016. Overall the tax incidence has proven to be

asymmetric between both policies.

Further research should account for three main phenomenons. Firstly, contrary to the tax increase, the repeal occurred halfway through the year and using annual IES data may induce some bias in our DiD estimates. Also, the repeal was not perfectly symmetrical to the increase as VAT for alcoholic beverages remained taxed at 23%. Nonetheless, it is not possible to isolate this effect due to data limitation. Finally, using hotels as a control group owns an associated bias as part of these firms own a catering service within their facilities. Ideally one could disentangle these effects but IES does not split hotel's accommodation provision from their catering service. We actually replicated our model using a control subsection group only containing accommodation services that do not provide any catering service. Empirical patterns were the same yet the number of observations was rather scarce.

Benzarti and Carloni (2019) concluded *"the concept of tax incidence is (...) agnostic about the direction of the tax change"* their work, as ours, poses this questions as we also find that the throughout our VAT roller-coaster, different agents bear different costs, collecting different benefits, giving support to different economic theories.

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A Appendix A - Data

A.1 Sector's Composition

This paper uses IES data on four sectors:

1. Catering Services - Treatment Group
2. Food Retailers - Main Control Group
3. Hotels and Accommodation Services - Robustness Control Group
4. Hairdressers and Beauty Saloons - Robustness Control Group

These groups were constructed according to the Portuguese Classification of Economic Activities - *CAE-Rev.3* published in 2007 which is harmonised with European directories *NACE-Rev.2*. The following Table present each sector's composition.

A.2 DiD Graphical Evidence

Figures 4 and 5 display pre-treatment trends for outcomes of interest for 2006/15. Treatment group, restaurants, is represented by the light red series while controls are depicted in the blue series. The cut-off is in 2011, the lart period before the reform.

A.3 Descriptive Statistics Across Sectors

Table 12 presents mean values for outcomes of interest and firms' characteristics for 2006 - 2017. Values are expressed in nominal euros. Median values are presented within paranthesis. The main control group are food retailers. Column (3) shows values for hotels and (4) for hairdressers and beauty saloons.

Table 11: Sector's Composition according to CAE-Rev.3

Group	CAE	Description
Catering S.	56101	Restaurantes tipo tradicional
Catering S.	56102	Restaurantes com lugar ao balcão
Catering S.	56103	Restaurantes sem serviço de mesa
Catering S.	56104	Restaurantes típicos
Catering S.	56105	Restaurantes com espaço de dança
Catering S.	56106	Confecção de refeições prontas a levar para casa
Catering S.	56210	Fornecimento de refeições para eventos
Catering S.	56290	Outras atividades de serviço de refeições
Catering S.	56301	Cafés
Catering S.	56302	Bares
Catering S.	56303	Pastelarias e casas de chá
Catering S.	56304	Outros estabelecimentos de bebidas sem espetáculos
Catering S.	56305	Estabelecimentos de bebidas com espaço de dança
Food Retail	47112	Comércio a retalho em est. n/ esp. c/ predominância de produtos alimentares
Food Retail	47210	Comércio a retalho de frutas e produtos hortícolas
Food Retail	47220	Comércio a retalho de carne e produtos à base de carne
Food Retail	47230	Comércio a retalho de peixe, crustáceo e molusco
Food Retail	47240	Comércio a retalho de pão, produtos de pastelaria e confeitaria
Food Retail	47250	Comércio a retalho de bebidas
Food Retail	47291	Comércio a retalho de leite e derivados
Food Retail	47292	Comércio a retalho de produtos alimentare naturais e dietéticos
Food Retail	47293	Outro comércio a retalho de produtos alimentares
Hotels	55111	Hotéis com restaurante
Hotels	55112	Pensões com restaurante
Hotels	55113	Estalagens com restaurante
Hotels	55114	Pousadas com restaurante
Hotels	55115	Motéis com restaurante
Hotels	55116	Hotéis-Apartamentos com restaurante
Hotels	55117	Aldeamentos turísticos com restaurante
Hotels	55118	Apartamentos turísticos com restaurante
Hotels	55119	Outros estabelecimentos hoteleiros com restaurante
Hotels	55121	Hotéis sem restaurante
Hotels	55122	Pensões sem restaurante
Hotels	55123	Apartamentos sem restaurante
Hotels	55124	Apartamentos turísticos sem restaurante
Hotels	55201	Outros estabeleciementos hoteleiros
Hotels	55202	Alojamento mobilado para turistas
Hotels	55203	Turismo no espaço rural
Hotels	55204	Outros locais de alojamento de curta duração
Hotels	55300	Parques de campismo e caravanismo
Hotels	55900	Outros locais de alojamento
Hairdressers	96021	Salões de Cabeleireiro
Hairdressers	96022	Institutos de Beleza

Figure 4: Trends for Outcomes of Interest - Hotels

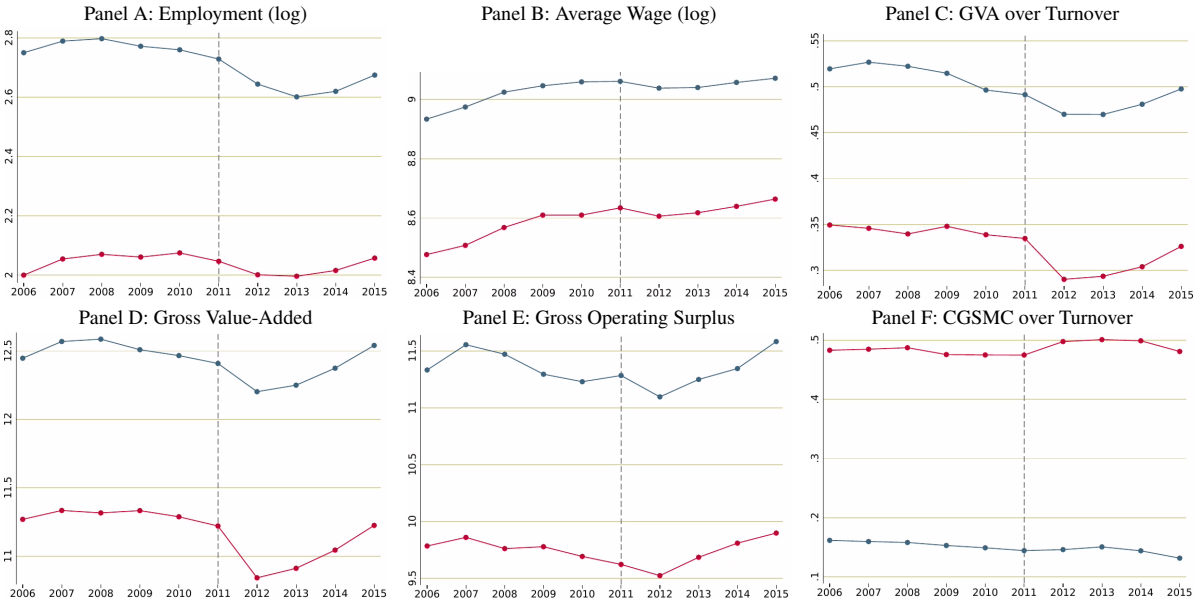

Figure 5: Trends for Outcomes of Interest - Hairdressers

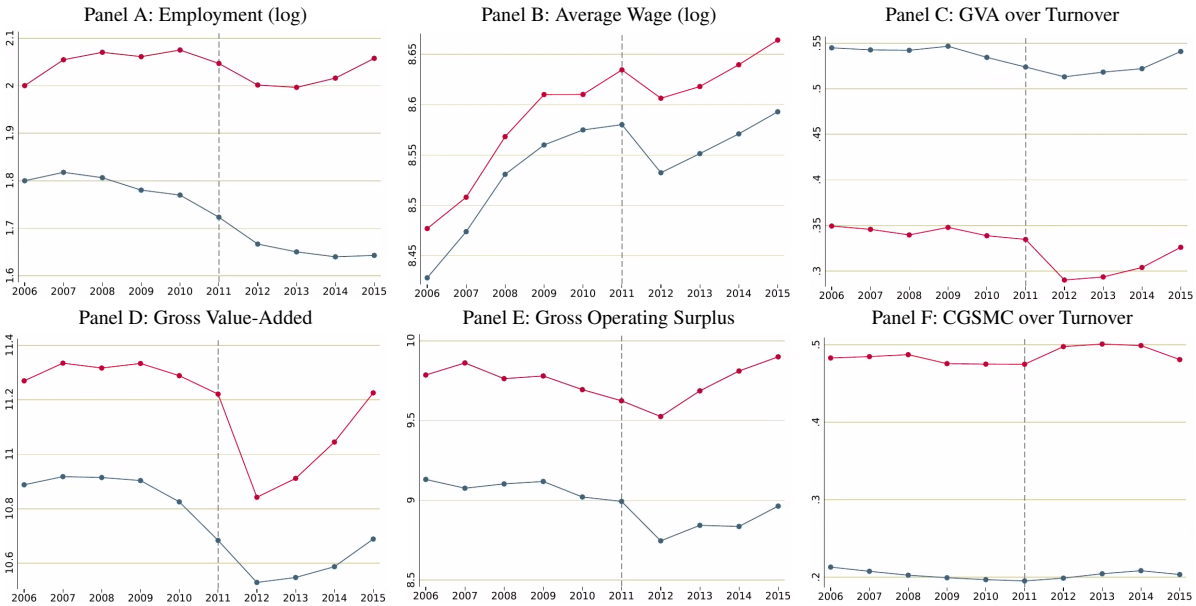

Table 12: Descriptive Statistics: Catering Services vs Control Groups for 2006 - 2017

	Treatment Group	Control Groups		
	Catering Services	Food Retailers	Hotels	Hairdressers
	(1)	(2)	(3)	(4)
Employment	15	9	32	7
	(7)	(5)	(13)	(5)
Average Wage	6 142	6 432	9 301	5 778
	(5 812)	(6 208)	(8 932)	(5 465)
G. Value-Added	201 998	153 042	822 494	89 157
	(73 938)	(75 262)	(236 885)	(45 914)
CGSMC Ratio	234 078	810 283	213 109	31 103
	(110 753)	(354 852)	(56 022)	(16 636)
Number of Firms	7 911	1 684	1 402	821
Observations	71 660	14 492	12 412	7 175

A.4 Firm's Controls

We use as controls firm's age, the logarithmic form trunover, gross value-added and gross operating surplus, as well as three ratios: $\frac{EBITDA}{Turnover}$; $EquityRatio = \frac{Equity}{TotalAssets}$ and $QuickRatio = \frac{CurrentAssets - Inventories}{CurrentLiabilities}$. However, we do not use the same controls for every outcome variable. Table 13 shows which controls we have used for each dependent variable.

Table 13: Controls

Controls	Employment	Avg. Wage	Mark-Up	G.V.A.	CGSMC
Age	X	X	X	X	X
EBITDA/Turn	X	X	X	X	X
Equity Ratio	X	X	X	X	X
Quick Ratio	X	X	X	X	X
Turnover(log)	X	X			
GVA (log)	X	X			
GOS (log)	X	X			X

A.5 PORDATA and Tourism by Municipality

We use the number of sleepovers, in hotels or any other accommodation service, of tourists per year to determine the most touristic municipalities in Continental Portugal. We order municipalities by their annual average number of sleepovers in the period 2012/2017. Top 10% is given by:

Table 14: Top 10% most touristic municipalities in Continental Portugal

Municipality	2012	2013	2014	2015	2016	2017	Average
Lisboa	6 789 166	7 237 915	9 008 523	9 999 851	11 066 130	12 553 476	9 442 510
Albufeira	6 412 895	6 377 959	7 177 322	7 306 242	8 124 832	8 395 439	7 299 115
Porto	1 815 157	2 012 153	2 548 591	2 879 833	3 300 011	3 782 858	2 723 101
Loulé	1 932 791	2 087 392	2 271 927	2 305 686	2 531 404	2 683 095	2 302 049
Portimão	1 791 267	1 789 486	2 015 985	2 142 850	2 296 096	2 511 614	2 091 216
Lagoa	1 031 493	1 179 867	1 335 126	1 436 622	1 595 813	1 649 321	1 371 374
Cascais	1 202 055	1 206 730	1 310 461	1 347 352	1 426 743	1 589 183	1 347 087
V.R.S. António	914 862	972 734	1 037 603	1 080 857	1 171 598	1 219 374	1 066 171
Lagos	768 822	788 062	857 061	990 996	1 110 716	1 223 138	956 466
Ourém	572 861	551 042	647 091	727 904	773 154	1 298 259	761 719
Tavira	586 598	559 778	697 992	650 713	647 295	732 342	645 786
V.N. Gaia	357 098	435 438	490 789	564 340	592 587	663 957	517 368
Coimbra	381 854	364 099	480 103	526 235	572 651	637 973	493 819
Évora	309 544	310 364	375 983	458 925	516 066	585 931	426 136

Source: PORDATA, *Inquérito à Permanência de Hóspedes na Hotelaria e outros Alojamentos*

A.6 Value-Added Tax Across the EU

Table 15: VAT Across Member of European Union for Catering Services

Member States	VAT on Restaurants	Tariff	Notes
Austria	10%	Reduced	
Belgium	12%	Intermediate	21% for drinks
Bulgaria	20%	Standard	
Croatia	25%	Standard	
Cyprus	9%	Reduced	
Czech Rep.	15%	Intermediate	21% for alchoolic beverages
Denmark	25%	Standard	
Estonia	20%	Standard	
Finland	14%	Intermediate	Excludes alcoholic bev.
France	10%	Intermediate	5%- school canteens; 20%- alcoholic beverages
Germany	19%	Standard	
Greece	24%	Standard	
Hungary	5%	Reduced	
Ireland	14%	Intermediate	Hospital/school canteens exempt; 23%- drinks
Italy	10%	Intermediate	
Latvia	21%	Standard	
Lithuania	21%	Standard	
Luxembourg	3%	Reduced	17% for alcoholic beverages
Malta	18%	Standard	
Netherlands	9%	Reduced	21% for alcoholic beverages
Poland	8%	Intermediate	23% for drinks
Portugal	13%	Intermediate	23% for alcoholic beverages
Romania	5%	Reduced	19% - alcoholic bev. other than draft beer
Slovakia	20%	Standard	
Slovenia	9,5%	Reduced	For preparation of meals
Spain	10%	Reduced	
Sweden	12%	Intermediate	
U. Kingdom	20%	Standard	
Avg. Tariff	14%		

Source: "VAT Rates applied in the Member States of the EU, Situation at 1^{st} *July 2019".*